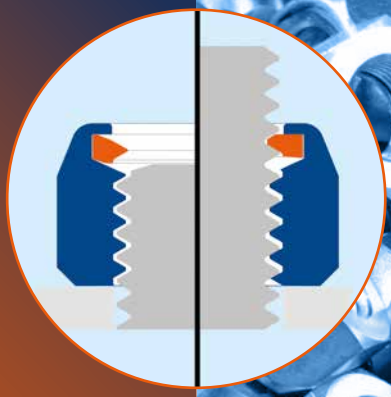
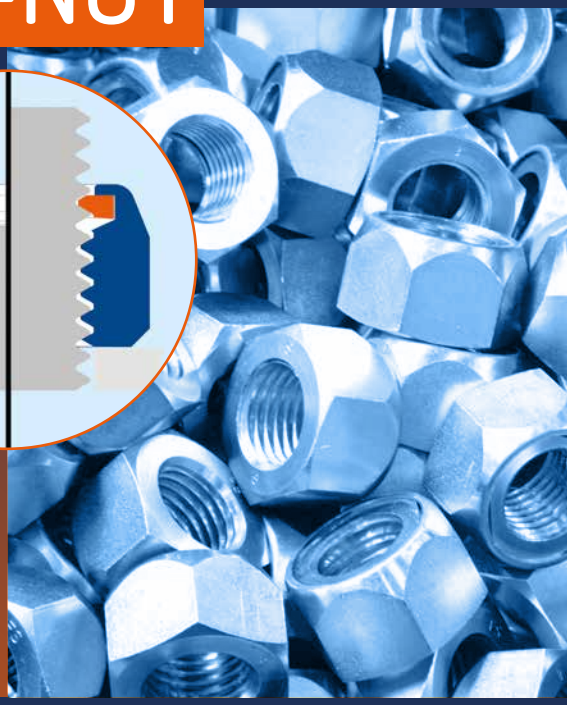
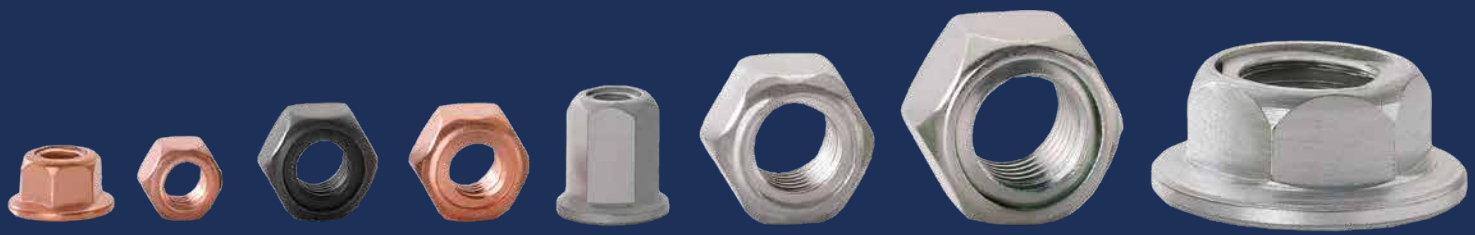
Flaig + Hommel

FS® ALL-STEEL LOCK-NUT



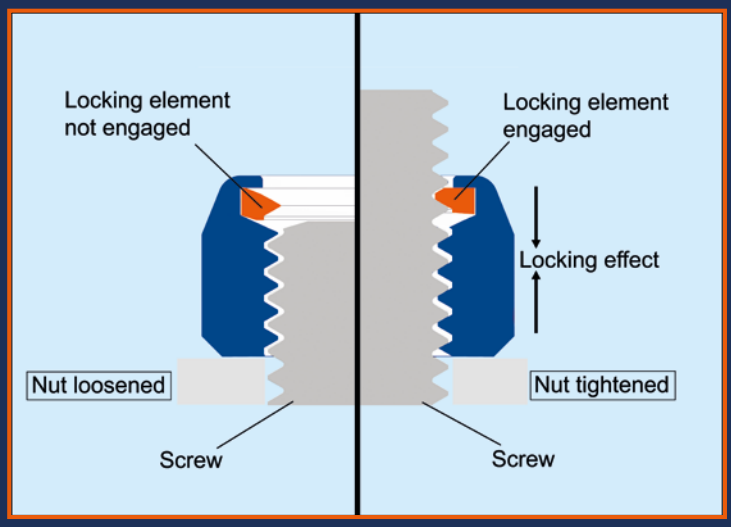




COMPETENT RELIABILITY EVEN UNDER EXTREME PRESSURE!

Seemingly unsolvable fastening problems with highly-dynamic threaded joints led to the development of the FS® All-Steel Lock-Nut. It has a flexible and completely threaded locking element which is fitted into the nut body and thus provides twice the security, at the highest level.

In contrast to the previously available lock-nuts marketed by the competition, the FS® All-Steel Lock-Nuts are designed for universal use.
This is due to the fact that the design combines all elements required for a safe threaded connection, such as re-usability, heat resistance, corrosion resistance, protection of the counter thread, and the narrow tolerance of the locking torque.



BASIC ADVANTAGES

- The FS® All-Steel Lock-Nut offers double the safety - the locking element works in the radial and the axial directions - and produces an even clamping effect of the nut from preload on to the full range (360°) of the screw threads.
- The spring element thread design meets all standards and has an inclined pitch, which prevents damage to the mating threads.
- Warehousing is very cost-effective, because of its universal usability.

Flaig + Hommel has gained a worldwide reputation as the manufacturer of FS® All-Steel Lock-Nuts and has been a reliable partner in the international automobile and railway industries for decades.

Application examples:

INDUSTRIAL AREAS	COMPONENTS	ATTACHING
1. Automotive industries	intermediate/adapter pipe exhaust manifold	high temperature range of the exhaust system
	catalytic converter component	catalytic converter flange connection to the exhaust pipe
	wind deflector	on the car body
	heat shield	of the fairing on the engine
2. Automotive supply industries	retarder hydraulic brake system	installation in vehicle
	heat exchanger of retarder brake	heat exchanger / hydraulic brake
	servo hydraulic pump	secure mounting of the toothed gear on the shaft
	exhaust system catalytic converter	weld nuts for repairing and replacement of components
	shock absorber	piston rod to chassis
3. Chassis and special automotive engineering applications	pneumatic cushion units	to the axle
	turn table of hydraulic jib trucks	to the chassis
	stationary wheel support (between the turntable axle and axle)	length adjustment of the wheel support
4. Process plant and machinery building industries	high-speed milling machine (18,000 rpm) shock braked	the milling tool and the drive shaft
	plate valves of recipr. compressor	spring steel pressure valve
	abrasion plate attaching (hot rolling mill)	in the furnace areas
	liquid filtration (aggressive chemicals)	filter components and inserts

ASSEMBLY BENEFITS

- The clamping torque is adjustable to accommodate your production, even with close tolerances.
- Heat-resistant materials are used at temperatures above 350°C, according to load requirements.
- Guaranteed high stripping strength, as load-bearing threads comply with the DIN EN ISO 2320 standard.
- FS® All-Steel Lock-Nuts comply with standards DIN EN ISO 7042, DIN EN ISO 10513; flange nuts comply with DIN EN ISO 1664, DIN EN ISO 1667, (DIN 980, DIN 6925, DIN 6927, DIN ISO 7044). Special shapes, i.e. extra flat designs, are possible.
- Cost-effective, space-saving and mounting applications that can be automated, compared to the castle nut with cotter pin, glued clamp nut, counter nut, etc.
- From square nut to double-hex nuts, all variants are available.

«

USER BENEFITS

- Well proven, even for the most difficult screw connections, e.g. for turbochargers, exhaust manifolds, catalytic converters, extremely stressed gearboxes, compressors and vibrating machine parts.
- Above and beyond that, it has facilitated new solutions for very difficult connections for years.

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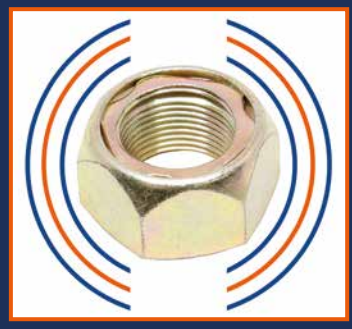
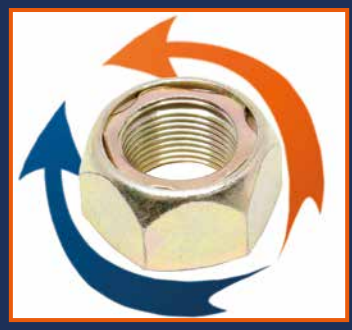
Heat-resistant! –
Still cool, even at 800°C



Vibration-resistant! –
Sturdy, even in extreme cases

Weather-resistant! –
Very durable, even in bad weather conditions

Acid-resistant! –
Still shines, even in aggressive environments



Reusable! –
Like new, even when used the 15th time

INDUSTRIAL AREAS	COMPONENTS	ATTACHING
5. Rolling Stock Industries Railway locomotives and rolling stock equipment of German Railway System – Deutsche Bahn AG BN 205 107 – 01 / STW 508.51.022 (brake area)	bogies	fixing of components (brakes, etc.)
	engine suspension	On the frame (chassis)
	braking system	disk brakes, brake cylinders and frames
	rubber / steel mounting blocks	on the steel wheels
	vibration dampers	
6. Magnetic hover train	stator and rotor	to the train
	magnetic packages	and track
7. Lifting equipment	steering swivel (fork trucks)	wheel bearings
	lifting equipment	securing the safety catch bolt
8. Ship and boat construction	propeller	propeller to the propeller shaft

RANGE OF APPLICATION

RAILROAD

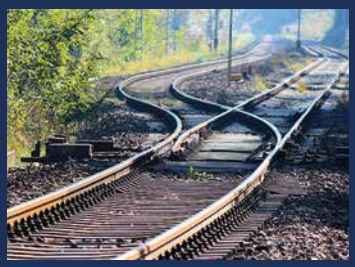
Brakes

Truck / bogie

Suspension

Bumper + clutch

Infrastructure

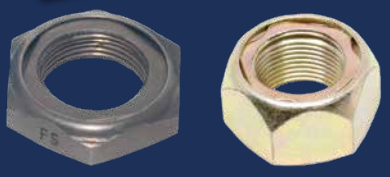


Power supply

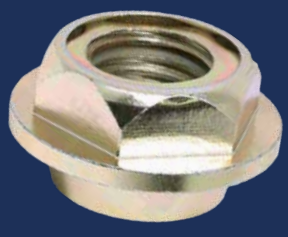
SPECIAL SHAPES

- height variants

stainless



- with flange



stainless

VEHICLE CONSTRUCTION

Articulated bus connection

Exhaust

Aggregate fixing

Full floating axle rear swinging

Full floating axle rear

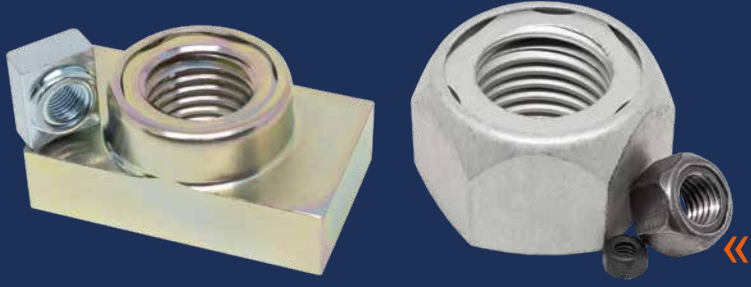
HEAVY DUTY APPLICATIONS

Technical assemblies

Chassis / rollers

- square, hexagonal, double-hexagonal, etc.

- various sizes



A STRONG CONNECTION FOR SURE!

COMPARISON – SCREW LOCKING

Requirements	FS® All-Steel Lock-Nut	Wedge thrust washers	Plastic ring	Liquid adhesive microencapsulation	Tooth lock nut	Castle nut + split pin	Spring washer	Locking plate
Heat-resistant > 350°C	●	●	~	~	●	●	●	●
Locking device	○	●	○	●	●	~	~	~
Captive joint	●	~	●	~	~	●	○	○
Reusability	●	●	○	~	○	~	●	○
Acid-resistant	●	●	○	○	●	●	●	●
Easy assembly (automation)	●	○	●	●	●	~	○	~
Attachable to any material	●	○	●	●	○	●	●	●
Compensation for setting behavior	●	~	●	●	~	●	~	●

● well suited / ○ conditionally suitable / ~ not suitable

PRODUCTION + QUALITY ASSURANCE

We manufacture components in all kinds of shapes and sizes in our state-of-the-art pressing plant. In order to meet the high quality demands of our customers, we always try to optimize our production processes. This is how Flaig + Hommel has become one of the leading hubs of competence in the field of cold forming over the last few decades.

The production of milling and turning parts is one of our strategically important business areas in addition to our cold forming processes. Our powerful team of cutting tool specialists ensures a high degree of precision for small-, medium- and large-scale series productions.

Our products are reviewed by our internal quality assurance team throughout the entire production process.
If necessary, our innovative test systems can provide 100% testing of the components.

The factors driving our success are decades of experience of our engineers and machine operators, coupled with a comprehensive quality assurance system.

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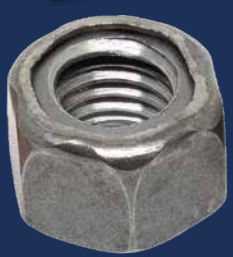
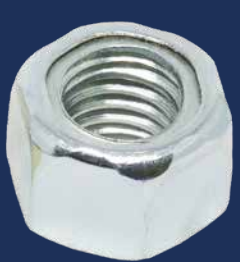




stainless

TECHNICAL DATA

Property class according to DIN EN ISO 898-2:
04, 05, 8, 10, 12

Design:
Prevailing torque type, all-metall hexagon nuts:
Standard thread according to DIN EN ISO 7042 [DIN 980 (M), DIN 6925]
Fine thread according to DIN EN ISO 10513 [DIN 980 (M), DIN 6925]

Prevailing torque type, all-metall hexagon nuts with flange:
Standard thread according to DIN EN 1664 [DIN 6927, ISO 7044]
Fine thread according to DIN EN 1667 [DIN 6927]

Mechanical properties:
DIN EN ISO 2320 (DIN EN 20898-2/ DIN EN ISO 898-2)

Special materials:
Highly heat resistant materials:

1.7218	25CrMo4	KG
1.7225	42CrMo4	GC
1.7709	21CrMoV5-7	GA
1.4923	X22CrMoV12-1	V (VH)
1.4980	X6NiCrTiMoVB25-15-2	SD

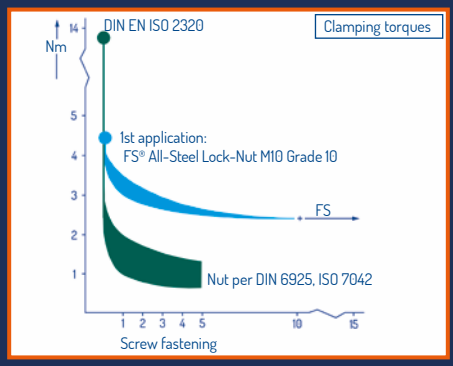
Stainless steels:
A2-035, A2-040, A2-70, A2-80,
A4-035, A4-040, A4-70, A4-80

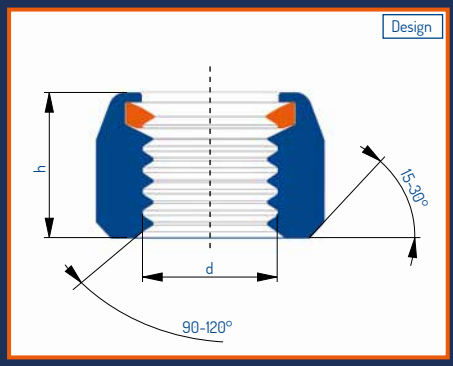
Surface coatings:
Galvanic surfaces according to DIN EN ISO 4042 (zinc-iron, zinc-nickel, etc.), zink flake coating according to DIN EN ISO 10683, phosphating, hot-dip galvanizing, copper-plating, QPQ, etc.

Threads:
Metric and Imperial: standard and fine threads
All other threads available on request

All other dimensions, materials and surfaces, per drawing, upon request.

Approved by the
German Railway System
Deutschen Bahn AG
in BN 205 107-1
und StW 508.51.022.





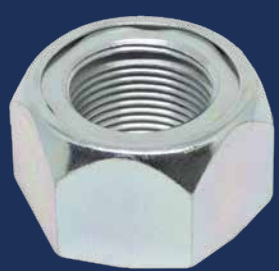
Dimensions				Clamping torques [Nm]		
d	h	AF	e min.	1. Screw fastening	1. Unscrewing	15. Unscrewing
				max.	min.	min.
M 5	5	8	8,79	1,6	0,29	0,2
M 6	6	10	11,05	3,0	0,45	0,3
M 8	8	13	14,38	6,0	0,85	0,6
M 10	10	16	17,77	7,0	1,5	1,0
M 10	10	17	18,90	7,0	1,5	1,0
M 12	12	18	20,03	11,0	2,3	1,6
M 12	12	19	21,10	11,0	2,3	1,6
M 14	14	21	23,36	17,0	3,3	2,3
M 14	14	22	24,49	17,0	3,3	2,3
M 16	16	24	26,75	22,0	4,5	3,0
M 18	18	27	29,56	29,0	6,0	4,2
M 20	20	30	32,95	38,0	7,5	5,3
M 22	22	32	35,72	48,0	9,5	6,5
M 24	24	36	39,55	56,0	11,5	8,0
M 27	27	41	45,63	66,0	13,5	10,0
M 30	30	46	50,85	76,0	16,0	12,0
M 33	33	50	55,37	85,0	18,0	14,0
M 36	36	55	60,79	95,0	21,0	16,0
M 39	39	60	66,44	105,0	23,0	18,0
M 42	42	65	72,61	115,0	30,0	20,0
M 48	48	75	83,91	130,0	40,0	25,0
M 56	56	85	95,07	160,0	50,0	30,0
M 64	64	95	106,37	200,0	60,0	35,0

After the 5th time of unscrewing the fastener, the clamping torque will remain constant.
Recommended tightening speed is 100-150 rpm for steel and galvanized steel, a maximum of 30 rpm for stainless steel

Verification calculations are recommended for the locking torques! (VDI 2230-2015).
Further locking torques can be found in the separate FS-data sheet.

FS® All-Steel Lock-Nuts, made of austenitic steel (A2 / A4) can be bolted together without additional lubricants. The nuts are covered with a special surface coating, preventing them from pitting onto the bolts. This coating has been approved by the Deutsche Bahn AG (German railroad).



REFERENCES

DB · Russian Railways · PKP · SBB CFF FFS · ÖBB · Cargo · DSB · SJ · VR · B · MÁV · TRENITALIA GRUPPO FERROVIE DELLO STATO ITALIANE · renfe · TCDD · CFR

SIEMENS · ALSTOM · BOMBARDIER · CAF · STADLER · Talgo · 中国中车 CRRC · ŠKODA

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DAIMLER · BMW · BOSCH · FIAT · Audi · SEAT · PORSCHE

CERTIFICATIONS

IATF 16949 · ISO 9001 · ISO 14001 · ISO 50001 · DIN EN 15048-1 · Deutsche Bahn Q1-Status

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